Force Balance Commentary 2022 Crash Test Force Balance Results

For 2022 SCARS had 3 crash tests. In Crash Tests 1 & 2 the bullet vehicle experienced 2 impacts (with resulting crush) as part of the test. There were also secondary impacts by the target vehicle into the side of the bullet vehicle in both tests due to the spin induced in the target by the offset hit. These secondary impacts have not been analyzed.

In Crash Test 1 the bullet vehicle impacted the target, and then continued on to hit the concrete rails stacked behind the impact point.

In Crash Test 2 the bullet vehicle impacted the target, and then continued on to hit the side of the bullet vehicle from test 1 driving it on to hit the concrete rails stacked beyond the impact point.

In Crash Test 3 neither the bullet vehicle nor the target vehicle had any secondary impacts.

Obviously, Crash Test 3 is ideal for a Speed from Crush analysis since there is no crushing of the vehicles other than in the crash itself.

Crash Tests 1 & 2 are less ideal since they had crush energy losses at two points within the test, with no way to separate how much crush was done in the first impact between the bullet and target, and how much crush was due to the secondary impact between the concrete (in test 1) or the buffer vehicle (in test 2).

Due to a limited number of Crash Tests in the NHTSA database for the Similar Vehicle year range for the Ford Police Interceptor (Taurus) and the Mazda 626, "CLASS" vehicles based on the Make and Model were developed to establish the A-B Stiffness MIN-AVG-MAX and Standard Deviation used within the Force Balance model.

CRASH TEST 1

The setup for Test 1 is that the Charger began to pull out into the intersection and then stopped. The driver of the Police Interceptor stated that he was doing "around 50 mph". After the collision occurred, the Police Interceptor continued on and impacted a concrete wall on the opposite side of the "T" intersection.

In Crash Test 1 a 2 point profile was used for the crush damage to the front of the crush damage to the Ford Police Interceptor bullet vehicle, and a 3 point profile was used for the damage to the side of the Dodge Charger around the front wheel well.

For the first run through I like to set the Lever Arm on both vehicles to 0 and set the Angle to the Collision Surface to 0 for both vehicles. The result of this on the speed calculations is that the closing speeds calculated will be at a minimum for each set of A-B stiffness values.

Using this setup, the closing (in this case, impact) speed of the Police Interceptor based on average stiffness values for the Police Interceptor (Taurus) is 49.3 mph. The likely range of the closing speed is within +/- one Standard Deviation of the average which is 38.4-58.2 mph.

Since the impact was over the front axle of the Charger, the effect of the lever arm of \sim 56 inches was also analyzed. When the lever arm was added, the closing speed of the Police Interceptor based on the average stiffness values increases to 60.1 mph with a likely range of 46.8-71.0 mph. It can be seen that adding the lever arm increases the calculated closing speed in this test by about 11 mph for the average stiffness values.

Recall that the bullet vehicle had two significant impacts to its front end in this test, the result of this is that there is more crush to the Police Interceptor than can be attributed to the impact between the Police Interceptor and the Charger. This will result in a higher than actual speed calculated for the Police Interceptor for the impact between the Police Interceptor and the Charger.

The Force Balance model results for this test printed "two up" follow this explanation. The CLASS Stiffness Test Summary and 2 pages for each of the Force Balance results printed one per page follow at the end of these explanations.

Available Test Results Front Impact Test Summary Report Filter Settings

Year Range: 2000 - 2021

Make: FORD Model: TAURUS

Test Number	Vehicle Info	No Damage Speed (mph)	Average Crush (inch)	KEES (mph)	V Sti A		Width- Values G		Crush Factor
5143	2004 FORD TAURUS FOUR DOOR SEDAN	5.0	20.9	34.7	297.6	84.6	523.1	115.5	23.1
4150	2001 FORD TAURUS FOUR DOOR SEDAN	5.0	19.3	34.7	326.1	100.5	529.3	137.2	25.0
4174	2001 FORD TAURUS FOUR DOOR SEDAN	5.0	15.1	29.5	341.7	110.4	529.0	160.1	22.9
4134	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	14.9	29.7	352.2	116.5	532.3	168.5	23.6
4135	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	14.9	29.6	352.3	116.8	531.4	169.0	23.6
3248	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	17.8	35.2	363.8	123.2	537.1	167.4	27.8
4776	2004 FORD TAURUS FOUR DOOR SEDAN	5.0	17.8	35.1	364.4	123.1	539.6	167.3	27.6
3225	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	12.0	27.3	375.3	140.2	502.5	209.9	25.0
4987	2004 FORD TAURUS FOUR DOOR SEDAN	5.0	10.6	24.7	379.3	141.6	508.0	222.4	23.1
6808	2010 FORD TAURUS FOUR DOOR SEDAN	5.0	19.4	35.1	381.8	118.7	614.1	161.4	25.5
7302	2010 FORD TAURUS FOUR DOOR SEDAN	5.0	12.1	24.7	384.5	125.4	589.5	197.0	20.2
7271	2010 FORD TAURUS FOUR DOOR SEDAN	5.0	11.9	24.7	392.5	130.5	590.3	205.0	20.6
6964	2011 FORD TAURUS FOUR DOOR SEDAN	5.0	17.9	35.1	408.3	137.1	608.0	186.4	27.5
3224	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	12.1	30.0	412.6	170.2	500.2	245.0	29.7
3150	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	12.1	29.9	428.2	175.7	521.7	253.4	29.5
6967	2011 FORD TAURUS FOUR DOOR SEDAN	5.0	7.5	19.9	443.5	176.9	556.1	315.7	21.2
7872	2013 FORD TAURUS FOUR DOOR SEDAN	5.0	15.4	34.8	474.2	183.1	614.0	249.8	31.4
		Avera	ge (AVG)		381.1	133.8	548.6	195.9	25.1
		Minim	um (MIN)		297.6	84.6	500.2	115.5	20.2
		Maximu	ım (MAX))	474.2	183.1	614.1	315.7	31.4
	Standard Deviation	on (STDev	-sample)		43.7	28.2	39.2	49.7	3.3
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Crash Test 1 - No Lever Arm

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2013 FORD TAURUS AWD - Front Impact

gle Coll Force to Normal (degrees): No Damage Speed (mph): Energy Crush Depth (inches): 15.00	nown" Stiffness Values		
Damage Length (inches): 65.0 Crush Profile Measurements: 2	Average Minimum Maximum Std. Devation	A 348.4 181.2 593.3 78.9	B 116.2 29.5 286.6 53.6
Spacing Zone Area De	Zone Area epth(x) Depth(x) (inches³) 8.21 8005.83	Zone Depth(y) (inches) 38.28	Area Depth(y) (inches³) 37320.83

Results			Average		KE		Closing
Results			Force	Damage	Speed	Delta V	Speed
	Α	В	(poundsf)	Energy (ft*lbs)	(mph)	(mph)	(MPH)
Minimum	181.2	29.5	20270.25	37417.88	16.2	13.7	28.6
Avg - 2 Std. Deviations	190.6	9.0	10582.00	32422.77	15.0	11.9	24.9
Avg - 1 Std. Deviations	269.5	62.6	39276.25	66802.92	21.6	18.4	38.4
Average	348.4	116.2	67970.50	108659.78	27.5	23.6	49.3
Avg + 1 Std. Deviations	427.3	169.8	96664.75	150912.93	32.5	27.9	58.2
Avg + 2 Std. Deviations	506.2	223.4	125359.00	193277.12	36.7	31.6	65.9
Maximum	593.3	286.6	158999.75	242738.01	41.2	35.4	73.9
Damage Centroid Depth (x) (inches)	8.21			k²	3474.23	
Damage Centroid Depth (y) (inches)	38.28		Eff. Mass Ratio (gamma)	1.00	
Area of Damage	(inches²):	975.00					

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257.4

Maximum

Damage Centroid Depth (x) (inches)

Damage Centroid Depth (y) (inches)

Area of Damage (inches2):

438.8

4.78

43.56

675.36

2015 DODGE CHARGER - Side Impact PDOF 3950 Curb Weight (pounds): Lever Arm Distance (inches): 0.00 0 Occupant + Cargo Weight (pounds): 2862.50 Yaw Moment of Inertia (lb-ft-sec²) 3950 Total Weight (pounds): Angle Coll Force to Normal (degrees): 0.0 2.0 No Damage Speed (mph): Energy Crush Depth (inches): 8.04 84.0 Damage Length (inches): Crush Profile Measurements: 3 Unequal Zone Area Zone Area Depth(x) Depth(y) Depth(y) Spacing Zone Area Depth(x) (inches) (inches2) (inches) (inches3) (inches) (inches3) 0.00 C1 (inches) 47.00 305.50 4.33 1323.83 31.33 9572.33 C2 (inches) 13.00 37.00 370.00 5.15 1905.50 53.65 19850.50 7.00 C3 (inches) C4 (inches) C5 (inches) C6 (inches) C7 (inches) C8 (inches) C9 (inches) C10 (inches) 8.04 Average Crush (inches): KE Average Results Force Damage Speed Delta V В (poundsf) Energy (ft*lbs) (mph) (mph) bsub1 86.3 49.3 20270.25 18647.28 11.9 14.9 20.1 Minimum Avg - 2 Std. Deviations 60.0 23.9 10582.00 10329.33 8.9 13.0 14.0 123.4 101.0 Avg - 1 Std. Deviations 39276.25 34639.16 16.2 20.0 28.8 165.2 180.7 67970.50 58454.05 21.1 25.7 38.5 Average 198.7 261.5 25.0 30.3 Avg + 1 Std. Deviations 96664.75 82081.74 46.3 Avg + 2 Std. Deviations 227.5 342.9 125359.00 105602.27 28.3 34.4 53.1

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158999.75

133087.59

Eff. Mass Ratio (gamma)

31.8

Serial Number: 21R-030201SC01301

38.5

3360.21

1.00

60.0

Crash Test 1 - with Lever Arm

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2013 FORD TAURUS AWD - Front Impact

15.00

Average Crush (inches):

Registered Owner: 4N6XPRT SYSTEMS

Curb Weight (pounds): 4296 Occupant + Cargo Weight (pounds): 0 Total Weight (pounds): 4296	PDOF Lever Arm Distance (inches): 0.00 Yaw Moment of Inertia (lb-ft-sec²) 3218.88
Angle Coll Force to Normal (degrees): No Damage Speed (mph): 5.0 Energy Crush Depth (inches): Damage Length (inches): Crush Profile Measurements: 2	"Known" Stiffness Values A B Average 348.4 116.2 Minimum 181.2 29.5 Maximum 593.3 286.6 Std. Devation 78.9 53.6
Equal Spacing (inches) Zone Area (inches) (inches) 23.00	Zone Depth(x) (inches) Area Depth(x) (inches) Zone Depth(y) (inches) Area Depth(y) (inches³) 8.21 8005.83 38.28 37320.83 37320.83 38.28 37320.83 3828 3820.83 3820.83 3829 3820.83 3820.83 3829 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83 3820 3820.83 3820.83

Results			Average		KE		Closing	
Results			Force	Damage	Speed	Delta V	Speed	
	Α	В	(poundsf)	Energy (ft*lbs)	(mph)	(mph)	(MPH)	
Minimum	181.2	29.5	20270.25	37417.88	16.2	11.2	34.8	
Avg - 2 Std. Deviations	190.6	9.0	10582.00	32422.77	15.0	9.8	30.4	1
Avg - 1 Std. Deviations	269.5	62.6	39276.25	66802.92	21.6	15.1	46.8	—
Average	348.4	116.2	67970.50	108659.78	27.5	19.4	60.1	1
Avg + 1 Std. Deviations	427.3	169.8	96664.75	150912.93	32.5	22.9	71.0	l
Avg + 2 Std. Deviations	506.2	223.4	125359.00	193277.12	36.7	25.9	80.4	
Maximum	593.3	286.6	158999.75	242738.01	41.2	29.1	90.1	1
Damage Centroid Depth (>	() (inches)	8.21			k²	3474.23	3	
Damage Centroid Depth (y	/) (inches)	38.28		Eff. Mass Ratio (gamma)	1.00)	
Area of Damage	(inches²):	975.00						

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2015 DODGE CHARGER - Side Impact

Curb Weight (pour Occupant + Cargo Weight (pour		0	PDOF Lev	er Arm Distance	e (inches):	56.00
Total Weight (pour			Yaw Moi	ment of Inertia	(lb-ft-sec²)	2862.50
ngle Coll Force to Normal (degre	ees): 0	.0				
No Damage Speed (m	iph): 2	.0				
Energy Crush Depth (incl	hes): 8.0)4				
Damage Length (incl	hes): 84	.0				
Crush Profile Measureme	ents:	3				
	Unequal		Zone	Area	Zone	Area
	Spacing	Zone Area	Depth(x)	Depth(x)	Depth(y)	Depth(y)
C1 (inches) 0.00	(inches)	(inches²)	(inches)	(inches³)	(inches)	(inches³)
	47.00	305.50	4.33	1323.83	31.33	9572.33
C2 (inches) 13.00	37.00	370.00	5.15	1905.50	53.65	19850.50
C3 (inches) 7.00					$\overline{}$	
C4 (inches)		=		\vdash	=	
C5 (inches)						
C6 (inches)						
C7 (inches)		\vdash				
C8 (inches)		\vdash	-		-	
C9 (inches)						
C10 (inches)						
Average Crush (inches):	8.04					

Danulan			Average		KE		
Results			Force	Damage	Speed	Delta V	
	Α	В	(poundsf)	Energy (ft*lbs)	(mph)	(mph)	bsub1
Minimum [86.3	49.3	20270.25	18651.04	11.9	12.2	20.1
Avg - 2 Std. Deviations	60.0	23.9	10582.00	10331.36	8.9	10.7	14.0
Avg - 1 Std. Deviations	123.4	101.0	39276.25	34646.23	16.2	16.4	28.8
Average [165.2	180.7	67970.50	58466.06	21.1	21.1	38.5
Avg + 1 Std. Deviations	198.7	261.5	96664.75	82098.64	25.0	24.9	46.3
Avg + 2 Std. Deviations	227.5	342.9	125359.00	105624.05	28.3	28.2	53.1
Maximum [257.4	438.8	158999.75	133115.07	31.8	31.6	60.0
Damage Centroid Depth (x)	(inches)	4.78			k^2	3360.2	L
Damage Centroid Depth (y)	(inches)	43.56		Eff. Mass Ratio (gamma)	0.52	2
Area of Damage (i	inches²):	675.50					

CRASH TEST 2

The setup for Test 2 is that the Charger began to pull out into the intersection and then stopped part way through due to traffic in front of them.. The driver of the Lincoln MKZ stated that he was doing "around 50 mph". After the collision occurred, the Lincoln MKZ continued on and impacted a vehicle moving through the intersection in the opposite direction.

In Crash Test 2 a 2 point profile was used for the crush damage to the front of the crush damage to the Lincoln MKZ bullet vehicle, and a 4 point profile was used for the damage to the side of the Dodge Charger around the rear wheel well.

For the first run through I like to set the Lever Arm on both vehicles to 0 and set the Angle to the Collision Surface to 0 for both vehicles. The result of this on the speed calculations is that the closing speeds calculated will be at a minimum for each set of A-B stiffness values.

Using this setup, the closing (in this case, impact) speed of the Lincoln MKZ based on average stiffness values for the Lincoln MKZ (Similar Vehicle tests for the Ford Fusion is the basis for the stiffness values) is 45.8 mph. The likely range of the closing speed is within +/- one Standard Deviation of the average which is 38.0-52.4 mph.

Since the impact was over the rear axle of the Charger, the effect of the lever arm of \sim 64 inches was also analyzed. When the lever arm was added, the closing speed of the Lincoln MKZ based on the average stiffness values increases to 57.4 mph with a likely range of 47.7-65.7 mph. It can be seen that adding the lever arm increases the calculated closing speed in this test by about 12 mph for the average stiffness values.

Recall that the bullet vehicle had two significant impacts to its front end in this test, the result of this is that there is more crush to the Lincoln MKZ than can be attributed to the impact between the Lincoln MKZ and the Charger. This will result in a higher than actual speed calculated for the Lincoln MKZ for the impact between the Lincoln MKZ and the Charger.

The Force Balance model results for this test printed "two up" follow this explanation. The Stiffness Test Summary and 2 pages for each of the Force Balance results printed one per page follow at the end of these explanations.

Available Test Results Front Impact Test Summary

Report Filter Settings

Year Range: 2007 - 2012

Make: LINCOLN Model: MKZ

Test Number	Vehicle Info	No Damage Speed (mph)	Average Crush (inch)	KEES (mph)		Vehicle iffness B			Crush Factor
6225	2008 FORD FUSION FOUR DOOR SEDAN	5.0	23.4	35.0	268.9	68.9	524.3	93.8	20.9
6755	2010 FORD FUSION FOUR DOOR SEDAN	5.0	21.9	35.0	278.5	76.1	509.5	103.7	22.3
5546	2006 FORD FUSION FOUR DOOR SEDAN	5.0	22.0	35.1	300.2	82.1	549.0	111.6	22.4
5804	2006 FORD FUSION FOUR DOOR SEDAN	5.0	12.5	25.1	344.7	111.0	535.3	173.2	20.2
7339	2011 FORD FUSION HYBRID FOUR DOOR SEDAN	5.0	19.6	35.1	354.2	108.7	577.4	147.7	25.1
7132	2011 FORD FUSION FOUR DOOR SEDAN	5.0	7.9	20.0	368.9	139.9	486.4	248.6	20.2
7139	2011 FORD FUSION FOUR DOOR SEDAN	5.0	17.7	35.2	401.1	136.9	587.3	186.0	28.0
5821	2006 FORD FUSION FOUR DOOR SEDAN	5.0	9.2	24.7	420.8	179.9	492.2	282.6	26.5
6728	2010 FORD FUSION HYBRID FOUR DOOR SEDAN	5.0	14.8	35.0	473.1	192.2	582.3	261.6	33.2
		Avera	ge (AVG)		356.7	121.7	538.2	178.7	24.3
		Minim	um (MIN)		268.9	68.9	486.4	93.8	20.2
		Maximu	ım (MAX))	473.1	192.2	587.3	282.6	33.2
	Standard Deviation	n (STDev	-sample)		68.0	44.2	38.5	71.5	4.3
	Nu	mber of	Tests (n)	9					

Crash Test 2 - No Lever Arm

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2008 LINCOLN WKZ - Front Impact	
Curb Weight (pounds): 3519 Occupant + Cargo Weight (pounds): 0 Total Weight (pounds): 3519	PDOF Lever Arm Distance (inches): 0.00 Yaw Moment of Inertia (lb-ft-sec²) 2418.57
Angle Coll Force to Normal (degrees): 0.0	"Known" Stiffness Values
No Damage Speed (mph): 5.0	A B Average 356.7 121.7
Energy Crush Depth (inches): 15.00	Minimum 268.9 68.9
Damage Length (inches): 62.0	Maximum 473.1 192.2
Crush Profile Measurements: 2	Std. Devation 68.0 44.2
Equal Spacing (inches) Zone An (inches)	(inches) (inches ³) (inches) (inches ³)
Results	Average KE Closing Force Damage Speed Delta V Speed
A B Minimum 268.9 68.9	(poundsf) Energy (ft*lbs) (mph) (mph) (MPH) 40374.40 64132.93 23.4 19.1 36.2
Minimum 268.9 68.9 Avg - 2 Std. Deviations 220.7 33.3	40374.40 64132.93 23.4 19.1 36.2
Avg - 1 Std. Deviations 288.7 77.5	44987.20 70800.01 24.6 20.1 38.0
Avg = 1 std. Deviations 200.7 77.3 Average 356.7 121.7	67648.20 102026.37 29.5 24.2 45.8
Avg + 1 Std. Deviations 424.7 165.9	90309.20 133438.01 33.7 27.7 52.4
Avg + 2 Std. Deviations 492.7 210.1	112970.20 164917.98 37.5 30.8 58.3
Maximum 473.1 192.2	104039.10 152879.43 36.1 29.7 56.1
Damage Centroid Depth (x) (inches) 7.60	k ² 3186.82
Damage Centroid Depth (v) (inches) 28.93	Eff. Mass Ratio (gamma) 1.00

2015 DODGE CHARGER - Side	e Impact				
Curb Weight (pounds): 395	=	PDOF Leve	er Arm Distance	(inches):	0.00
Occupant + Cargo Weight (pounds): Total Weight (pounds): 395	0	Yaw Mon	nent of Inertia (I	b-ft-sec²)	2862.50
Angle Coll Force to Normal (degrees): 0.0	_				
No Damage Speed (mph):	_				
Energy Crush Depth (inches): 3.3	_				
Damage Length (inches): 82.	_				
	<u></u>				
	4				
Unequal	Zone Area	Zone	Area	Zone	Area
Spacing (inches)	(inches ²)	Depth(x) (inches)	Depth(x) (inches³)	Depth(y) (inches)	Depth(y) (inches³)
C1 (inches) 0.00 31.00	108.50	2.33	253.17	20.67	2242.33
C2 (inches) 7.00 19.00	104.50	2.82	294.50	27.64	2888.00
C3 (inches) 4.00					
C4 (inches) 0.00 32.00	64.00	1.33	85.33	74.67	4778.67
C5 (inches)					
C6 (inches)					
C7 (inches)					
C8 (inches)	\sqsubseteq				
C9 (inches)					
C10 (inches)					
Average Crush (inches): 3.38					
Results	A	verage		KE	
	5 /		-	peed Delta	
A				(mph) (mpl	
Minimum190.6	235.0	40374.40	17331.49		7.1 43.4
Avg - 2 Std. Deviations 136.6	120.7	22326.20	10053.59		31.1
Avg - 1 Std. Deviations 202.3	264.8	44987.20	19176.12		7.9 46.1
Average 252.8	413.4	67648.20	28184.58		57.6
Avg + 1 Std. Deviations 295.4	564.3	90309.20	37133.87	16.8 24	4.7 67.2
Avg + 2 Std. Deviations 332.9	716.7	112970.20	46045.32	18.7 2	7.4 75.8
Maximum 318.6	656.5	104039.10	42536.84	18.0 20	72.5
Damage Centroid Depth (x) (inches)	2.29			k² 336	60.21
Damage Centroid Depth (y) (inches)	35.77	Eff.	Mass Ratio (ga	mma)	1.00
Area of Damage (inches²):	277.16				

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Area of Damage (inches²): 930.00

Crash Test 2 - with Lever Arm

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4N6XPRT StifCalcs® Force Balance - Page 2 of 2

2008 LINCOLN MKZ - Front Impact	
Curb Weight (pounds): 3519 Occupant + Cargo Weight (pounds): 0 Total Weight (pounds): 3519	PDOF Lever Arm Distance (inches): 0.00 Yaw Moment of Inertia (lb-ft-sec²) 2418.57
Angle Coll Force to Normal (degrees): 0.0	"Known" Stiffness Values A B
No Damage Speed (mph): 5.0	Average 356.7 121.7
Energy Crush Depth (inches): 15.00	Minimum 268.9 68.9
Damage Length (inches): 62.0	Maximum 473.1 192.2
Crush Profile Measurements: 2	Std. Devation 68.0 44.2
Equal Spacing (inches) Zone Area (inches²) C1 (inches) 18.00 62.00 930.00 C2 (inches) 12.00 930.00 C3 (inches) 12.00 10 10 10 10 10 10 10 10 10 10 10 10 1	Zone Depth(x) (inches) Area Depth(x) (inches³) Depth(y) (inches³) Depth(y) (inches³) 7.60 7068.00 28.93 26908.00
Results	Average KE Closing
	Force Damage Speed Delta V Speed (poundsf) Energy (ft*lbs) (mph) (mph) (MPH)
Minimum 268.9 68.9	40374.40 64132.93 23.4 15.3 45.4
Avg - 2 Std. Deviations 220.7 33.3	22326.20 40496.64 18.6 12.0 35.8
Avg - 1 Std. Deviations 288.7 77.5	44987.20 70800.01 24.6 16.0 47.7
Average 356.7 121.7	67648.20 102026.37 29.5 19.3 57.4
Avg + 1 Std. Deviations 424.7 165.9	90309.20 133438.01 33.7 22.1 65.7
Avg + 2 Std. Deviations 492.7 210.1	112970.20 164917.98 37.5 24.6 73.1
Maximum 473.1 192.2	104039.10 152879.43 36.1 23.6 70.3
Damage Centroid Depth (x) (inches) 7.60	k ² 3186.82
Damage Centroid Depth (y) (inches) 28.93	Eff. Mass Ratio (gamma) 1.00

2015 DODGE CHARGER - Side Impac	t
Curb Weight (pounds): 3950 Occupant + Cargo Weight (pounds): 0 Total Weight (pounds): 3950	PDOF Lever Arm Distance (inches): Yaw Moment of Inertia (lb-ft-sec²) 2862.50
Angle Coll Force to Normal (degrees): 0.0	
No Damage Speed (mph): 2.0	
Energy Crush Depth (inches): 3.38	
Damage Length (inches): 82.0	
Crush Profile Measurements: 4	
C1 (inches)	2.82 294.50 27.64 2888.00
	Average KE
Results A B	Force Damage Speed Delta V (poundsf) Energy (ft*lbs) (mph) (mph) bsub1
Minimum 190.6 235.0	40374.40 17331.49 11.5 13.6 43.4
Avg - 2 Std. Deviations 136.6 120.7	22326.20 10053.59 8.7 10.7 31.1
Avg - 1 Std. Deviations 202.3 264.8	44987.20 19176.12 12.1 14.3 46.1
Average 252.8 413.4	67648.20 28184.58 14.6 17.2 57.6
Avg + 1 Std. Deviations 295.4 564.3	90309.20 37133.87 16.8 19.7 67.2
Avg + 2 Std. Deviations 332.9 716.7	112970.20 46045.32 18.7 21.9 75.8
Maximum 318.6 656.5	104039.10 42536.84 18.0 21.1 72.5
Damage Centroid Depth (x) (inches) 2.29	k ² 3360.21
Damage Centroid Depth (y) (inches) 35.77	Eff. Mass Ratio (gamma) 0.45

4N6XPRT StifCalcs® licensed by 4N6XPRT Systems (www.4N6XPRT.com) to:

Area of Damage (inches²): 277.16

Area of Damage (inches²): 930.00

CRASH TEST 3

The setup for Test 3 is that the Charger began to pull out into the intersection to make a left turn and then stopped. The driver of the Mazda 626 stated that he was doing "around 50 mph". Both the Mazda 626 and the Charger had no additional impacts.

In Crash Test 3 a 3 point profile was used for the crush damage to the front of the crush damage to the Mazda 626 bullet vehicle, and a 4 point profile was used for the damage to the side of the Dodge Charger around the front wheel well.

For the first run through I like to set the Lever Arm on both vehicles to 0 and set the Angle to the Collision Surface to 0 for both vehicles. The result of this on the speed calculations is that the closing speeds calculated will be at a minimum for each set of A-B stiffness values.

Using this setup, the closing (in this case, impact) speed of the Mazda 626 based on average stiffness values for the Mazda 626 is 48.5 mph. The likely range of the closing speed is within +/- one Standard Deviation of the average which is 31.0-61.4 mph.

Although there is a "Angle to the Collision Face" (Side) of the Charger, impact was over the right front corner, with no angle. For that reason, no angle is input.

The Force Balance model results for this test printed "two up" follow this explanation. The CLASS Stiffness Test Summary and 2 pages for the Force Balance results printed one per page follow at the end of these explanations.

Available Test Results Front Impact Test Summary

Report Filter Settings

Year Range: 1965 - 2021

Model: 626

Test Number	Vehicle Info	No Damage Speed (mph)	Average Crush (inch)	KEES (mph)	•	Vehicle iffness B			Crush Factor
599	1983 MAZDA 626 FOUR DOOR SEDAN	5.0	24.4	35.3	216.8	53.8	436.8	73.0	20.4
1055	1987 MAZDA 626 FOUR DOOR SEDAN	5.0	20.3	29.5	217.2	52.4	450.5	75.9	17.1
118	1980 MAZDA 626 TWO DOOR COUPE	5.0	22.5	35.2	253.0	67.7	472.7	92.0	21.9
1015	1987 MAZDA 626 FOUR DOOR SEDAN	5.0	24.0	35.0	262.6	65.6	525.9	89.3	20.4
1742	1993 MAZDA 626 FOUR DOOR SEDAN	5.0	20.0	35.0	276.5	82.9	461.2	112.8	24.5
2866	1998 MAZDA 626 FOUR DOOR SEDAN	5.0	11.4	29.6	496.7	213.5	577.8	309.2	30.6
		Averaç	ge (AVG)		287.1	89.3	487.5	125.4	22.5
		Minim	ım (MIN)		216.8	52.4	436.8	73.0	17.1
		Maximu	ım (MAX))	496.7	213.5	577.8	309.2	30.6
	Standard Deviation	on (STDev	-sample)		105.5	61.8	53.8	91.2	4.6
	N	umber of	Tests (n)	6					

Crash Test 3 - no Lever Arm PDOF goes through CG's

4N6XPRT StifCalcs® Force Balance - Page 1 of 2

4N6XPRT StifCalcs® Force Balance - Page 2 of 2

1996 MAZDA 626 - Front Impact	2016 DODGE CHARGER
Curb Weight (pounds): 2626 Occupant + Cargo Weight (pounds): 0 Total Weight (pounds): 2626 PDOF Lever Arm Distance (inches): 0.00 Yaw Moment of Inertia (lb-ft-sec²) 1498.78	Curb Weight (pounds): 3950 Occupant + Cargo Weight (pounds): 0 Total Weight (pounds): 3950 PDOF Lever Arm Distance (inches): 0.00 Yaw Moment of Inertia (lb-ft-sec²) 2862.50
No Damage Speed (mph): 5.0	Angle Coll Force to Normal (degrees):
Average Crush (inches): Average KE Closing	Average Crush (inches): 2.72 Average KE
A B Force Damage Speed Delta V Speed MPH	Average Force Damage Speed Delta V (poundsf) Energy (ft*lbs) (mph) bsub1 Minimum 172.2 215.1 34838.32 13031.75 9.9 15.5 44.0 Avg - 2 Std. Deviations N/A N/A
4N6XPRT StifCalcs® licensed by 4N6XPRT Systems (www.4N6XPRT.com) to:	4N6XPRT StifCalcs® licensed by 4N6XPRT Systems (www.4N6XPRT.com) to:

Crash Test 1

Stiffness Test Summary
Force Balance no Lever Arm
Force Balance with Lever Arm

Available Test Results Front Impact Test Summary Report Filter Settings

Year Range: 2000 - 2021

Make: FORD Model: TAURUS

Test Number	Vehicle Info	No Damage Speed (mph)	Average Crush (inch)	KEES (mph)	V Sti A		Width- Values G		Crush Factor
5143	2004 FORD TAURUS FOUR DOOR SEDAN	5.0	20.9	34.7	297.6	84.6	523.1	115.5	23.1
4150	2001 FORD TAURUS FOUR DOOR SEDAN	5.0	19.3	34.7	326.1	100.5	529.3	137.2	25.0
4174	2001 FORD TAURUS FOUR DOOR SEDAN	5.0	15.1	29.5	341.7	110.4	529.0	160.1	22.9
4134	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	14.9	29.7	352.2	116.5	532.3	168.5	23.6
4135	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	14.9	29.6	352.3	116.8	531.4	169.0	23.6
3248	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	17.8	35.2	363.8	123.2	537.1	167.4	27.8
4776	2004 FORD TAURUS FOUR DOOR SEDAN	5.0	17.8	35.1	364.4	123.1	539.6	167.3	27.6
3225	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	12.0	27.3	375.3	140.2	502.5	209.9	25.0
4987	2004 FORD TAURUS FOUR DOOR SEDAN	5.0	10.6	24.7	379.3	141.6	508.0	222.4	23.1
6808	2010 FORD TAURUS FOUR DOOR SEDAN	5.0	19.4	35.1	381.8	118.7	614.1	161.4	25.5
7302	2010 FORD TAURUS FOUR DOOR SEDAN	5.0	12.1	24.7	384.5	125.4	589.5	197.0	20.2
7271	2010 FORD TAURUS FOUR DOOR SEDAN	5.0	11.9	24.7	392.5	130.5	590.3	205.0	20.6
6964	2011 FORD TAURUS FOUR DOOR SEDAN	5.0	17.9	35.1	408.3	137.1	608.0	186.4	27.5
3224	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	12.1	30.0	412.6	170.2	500.2	245.0	29.7
3150	2000 FORD TAURUS FOUR DOOR SEDAN	5.0	12.1	29.9	428.2	175.7	521.7	253.4	29.5
6967	2011 FORD TAURUS FOUR DOOR SEDAN	5.0	7.5	19.9	443.5	176.9	556.1	315.7	21.2
7872	2013 FORD TAURUS FOUR DOOR SEDAN	5.0	15.4	34.8	474.2	183.1	614.0	249.8	31.4
		Avera	ge (AVG)		381.1	133.8	548.6	195.9	25.1
		Minim	um (MIN)		297.6	84.6	500.2	115.5	20.2
		Maximu	ım (MAX))	474.2	183.1	614.1	315.7	31.4
	Standard Deviation	on (STDev	-sample)		43.7	28.2	39.2	49.7	3.3
		lumber of	• •	17					
			(/						

2013 FORD TAURUS AWD - Front Impact

ZOISTOND TAONO	JAND		ipact			
Curb Weight (pou Occupant + Cargo Weight (pou		96	PDOF Le	ever Arm Distan	ce (inches):	0.00
Total Weight (pou		96	Yaw Mo	oment of Inertia	(lb-ft-sec²)	3218.88
ngle Coll Force to Normal (deg	rees):	0.0	"Known" S	tiffness Values	A	В
No Damage Speed (r	mph):	5.0		Average	348.4	116.2
Energy Crush Depth (inc	ches): 15.	00		Minimum	181.2	29.5
Damage Length (in	ches): 6 !	5.0		Maximum	593.3	286.6
Crush Profile Measurem	onts:	2	Sto	d. Devation	78.9	53.6
Crush Profile Measuren	Equal		Zone	Area	Zone	Area
	Spacing	Zone Area		Depth(x)	Depth(y)	Depth(y)
C1 (inches) 7.00	(inches)	(inches²)	(inches)	(inches³)	(inches)	(inches³)
C2 (inches) 23.00	65.00	975.00	8.21	8005.83	38.28	37320.83
C3 (inches)						
C4 (inches)						
C5 (inches)						
C6 (inches)						
C7 (inches)						
C8 (inches)						
C9 (inches)] [
C10 (inches)						
Average Crush (inches):	15.00					
Average Crush (inches).	15.00		Average		KE	Closing
Results			Average Force	Damage		ta V Speed
	Α	В	(poundsf)	Energy (ft*lbs)	(mph) (m	ph) (MPH)
Minimum [181.2	29.5	20270.25	37417.88	16.2	13.7 28.6
Avg - 2 Std. Deviations	190.6	9.0	10582.00	32422.77	15.0	11.9 24.9
Avg - 1 Std. Deviations	269.5	62.6	39276.25	66802.92	21.6	18.4 38.4
Average [348.4	116.2	67970.50	108659.78	27.5	23.6 49.3
Avg + 1 Std. Deviations	427.3	169.8	96664.75	150912.93	32.5	27.9 58.2
Avg + 2 Std. Deviations	506.2	223.4	125359.00	193277.12	36.7	31.6 65.9
Maximum [593.3	286.6	158999.75	242738.01	41.2	35.4 73.9
Damage Centroid Depth (x)	(inches)	8.21			k ² 3	474.23
Damage Centroid Depth (y)	(inches)	38.28	E:	ff. Mass Ratio (g	jamma)	1.00
Area of Damage (i	nches²):	975.00				

2015 DODGE CHARGER - Side Impact

Curb Weight (pou Occupant + Cargo Weight (pou Total Weight (pou	ınds): 0		er Arm Distance		0.00 2862.50
Angle Coll Force to Normal (deg No Damage Speed (r Energy Crush Depth (ind Damage Length (ind	mph): 2.0 ches): 8.04				
Crush Profile Measurem C1 (inches) 0.00	Unequal Spacing Zone Area (inches) (inches²)	(inches)	Area Depth(x) (inches³)	Zone Depth(y) (inches)	Area Depth(y) (inches³)
C2 (inches)	47.00 305.50 37.00 370.00		1323.83	53.65	9572.33 19850.50
Average Crush (inches): Results	A B	(poundsf) End	ergy (ft*lbs)	KE Speed Delta (mph) (mph) bsub1
Minimum Avg - 2 Std. Deviations Avg - 1 Std. Deviations	86.3 49.3 60.0 23.9 123.4 101.0	20270.25 10582.00 39276.25	18647.28 10329.33 34639.16	8.9 13	.9 20.1 .0 14.0 .0 28.8
Average [Avg + 1 Std. Deviations [Avg + 2 Std. Deviations [165.2 180.7 198.7 261.5 227.5 342.9	96664.75 125359.00	58454.05 82081.74 105602.27	25.0 30 28.3 34	38.5 3 46.3 .4 53.1
Maximum L Damage Centroid Depth (x) Damage Centroid Depth (y) Area of Damage (i	(inches) 43.56	158999.75 Eff.	133087.59 Mass Ratio (ga	k ² 336	0.21 1.00

2013 FORD TAURUS AWD - Front Impact

Curb Weight (pou Occupant + Cargo Weight (pou Total Weight (pou	unds):	0		ever Arm Distar	•		0.00	
Angle Coll Force to Normal (degr No Damage Speed (r Energy Crush Depth (inc	rees): 0.	0	"Known" S	Average Minimum	S A 348.4		B 116.2	
Damage Length (in	ches): 65 .	.0		Maximum [593.3		286.6	
Crush Profile Measurements: 2			St	d. Devation	78.9)	53.6	
	Equal Spacing (inches)	Zone Area (inches²)		Area Depth(x) (inches³)	Zon Depth (inch	(y) [Area Depth(y) (inches³)	
C1 (inches) 7.00	65.00	975.00	8.21	8005.83	3	8.28	37320.83	
C2 (inches) 23.00					1			
C3 (inches)			_	- <u> </u>	- <u> </u>			
C4 (inches)]]]			
C5 (inches)			-	-	J			
C6 (inches)			J	J	J			
C7 (inches)					J	-		
C8 (inches)					<u> </u>			
C9 (inches)					<u> </u>			
C10 (inches)					J			
Average Crush (inches):	15.00							
- Twelage clash (menes).			Average		KE		Closing	
Results			Force	Damage	Speed	Delta V	Speed	
	Α	В	(poundsf)	Energy (ft*lbs)	(mph)	(mph)	(MPH)	
Minimum [181.2	29.5	20270.25	37417.88	16.2	11.2	34.8	
Avg - 2 Std. Deviations	190.6	9.0	10582.00	32422.77	15.0	9.8	30.4	
Avg - 1 Std. Deviations	269.5	62.6	39276.25	66802.92	21.6	15.1	46.8	
Average [348.4	116.2	67970.50	108659.78	27.5	19.4	60.1	
Avg + 1 Std. Deviations	427.3	169.8	96664.75	150912.93	32.5	22.9	71.0	
Avg + 2 Std. Deviations	506.2	223.4	125359.00	193277.12	36.7	25.9	80.4	
Maximum [593.3	286.6	158999.75	242738.01	41.2	29.1	90.1	
Damage Centroid Depth (x)	(inches)	8.21			k ²	3474.2	3	
Damage Centroid Depth (y)	(inches)	38.28	į.	Eff. Mass Ratio (gamma)	1.0	0	
Area of Damage (i	nches²):	975.00						

2015 DODGE CHA	KGEK - SIG	ie impac	τ				
Curb Weight (po			PDOF	_ever Arm Distar	nce (inches	s):	56.00
Dccupant + Cargo Weight (po Total Weight (po		50	Yaw N	Moment of Inert	ia (lb-ft-sed	c²)	2862.50
	·						
ngle Coll Force to Normal (de	<i>,</i>	0.0					
No Damage Speed	(mph):2	2.0					
Energy Crush Depth (i	nches): 8.	04					
Damage Length (i	inches): 84	4.0					
Crush Profile Measure	ments:	3					
	Unequal		Zone	Area	Zon	е	Area
	Spacing	Zone Area	1 , , ,	Depth(x)	Depth	-	Depth(y)
C1 (inches) 0.00		(inches²)		(inches³)	(inch		(inches³)
C2 (inches) 13.00	47.00	305.50			-	1.33	9572.33
C3 (inches) 7.00	37.00	370.00	5.15	1905.50	5	3.65	19850.50
C4 (inches)]			_	<u> </u>		
C5 (inches)]			_	<u> </u>		
C6 (inches)	<u> </u>			_	<u> </u>		
C7 (inches)	- - -		<u> </u>		<u> </u>		
C8 (inches)	<u>-</u>						
C9 (inches)	<u> </u>						
C10 (inches)							
Average Crush (inches):	8.04						
			Average		KE		
Results	•	Б	Force	Damage	Speed	Delta V	
	A	B	(poundsf)	Energy (ft*lbs)	(mph)	(mph)	bsub1
Minimum		49.3	20270.25	18651.04	11.9	12.2	
Avg - 2 Std. Deviations	60.0	23.9	10582.00	10331.36	8.9	10.7	14.0
Avg - 1 Std. Deviations	123.4	101.0	39276.25	34646.23	16.2	16.4	
Average	165.2	180.7	67970.50	58466.06	21.1	21.1	
Avg + 1 Std. Deviations	198.7	261.5	96664.75	82098.64	25.0	24.9	46.3
Avg + 2 Std. Deviations	227.5	342.9	125359.00	105624.05	28.3	28.2	
Maximum		438.8	158999.75	133115.07	31.8	31.6	
Damage Centroid Depth (x	x) (inches)	4.78			k ²	3360.2	1
Damage Centroid Depth (y) (inches)	43.56		Eff. Mass Ratio (gamma)	0.5	2
Area of Damage	(inches²):	675.50					

Crash Test 2

Stiffness Test Summary
Force Balance no Lever Arm
Force Balance with Lever Arm

Available Test Results Front Impact Test Summary

Report Filter Settings

Year Range: 2007 - 2012

Make: LINCOLN Model: MKZ

Test Number	Vehicle Info	No Damage Speed (mph)	Average Crush (inch)	KEES (mph)		Vehicle iffness B			Crush Factor
6225	2008 FORD FUSION FOUR DOOR SEDAN	5.0	23.4	35.0	268.9	68.9	524.3	93.8	20.9
6755	2010 FORD FUSION FOUR DOOR SEDAN	5.0	21.9	35.0	278.5	76.1	509.5	103.7	22.3
5546	2006 FORD FUSION FOUR DOOR SEDAN	5.0	22.0	35.1	300.2	82.1	549.0	111.6	22.4
5804	2006 FORD FUSION FOUR DOOR SEDAN	5.0	12.5	25.1	344.7	111.0	535.3	173.2	20.2
7339	2011 FORD FUSION HYBRID FOUR DOOR SEDAN	5.0	19.6	35.1	354.2	108.7	577.4	147.7	25.1
7132	2011 FORD FUSION FOUR DOOR SEDAN	5.0	7.9	20.0	368.9	139.9	486.4	248.6	20.2
7139	2011 FORD FUSION FOUR DOOR SEDAN	5.0	17.7	35.2	401.1	136.9	587.3	186.0	28.0
5821	2006 FORD FUSION FOUR DOOR SEDAN	5.0	9.2	24.7	420.8	179.9	492.2	282.6	26.5
6728	2010 FORD FUSION HYBRID FOUR DOOR SEDAN	5.0	14.8	35.0	473.1	192.2	582.3	261.6	33.2
		Avera	ge (AVG)		356.7	121.7	538.2	178.7	24.3
		Minim	um (MIN)		268.9	68.9	486.4	93.8	20.2
		Maximu	ım (MAX))	473.1	192.2	587.3	282.6	33.2
	Standard Deviation	n (STDev	-sample)		68.0	44.2	38.5	71.5	4.3
	Nu	mber of	Tests (n)	9					

2008 LINCOLN MKZ - Front Impact

2000 LINCOLN WINZ	- 110110	pact				
Curb Weight (pou Occupant + Cargo Weight (pou		0	PDOF	ever Arm Distan	ce (inches):	0.00
Total Weight (pou		19	Yaw M	oment of Inertia	a (lb-ft-sec²)	2418.57
Angle Coll Force to Normal (degr	rees):	0.0	"Known" S	Stiffness Values		D
No Damage Speed (n	nph):	5.0		Average	A 356.7	B 121.7
Energy Crush Depth (inc	thes): 15.	00		Minimum _	268.9	68.9
Damage Length (inc	thes): 6 2	2.0		Maximum _	473.1	192.2
Crush Profile Measurem	ents:	2	St	d. Devation	68.0	44.2
Crush Frome Wedsuren	Equal		Zone	Area	Zone	Area
	Spacing	Zone Area	1 ()	Depth(x)	Depth(y)	Depth(y)
C1 (inches) 18.00	(inches)	(inches²)		(inches³)	(inches)	(inches³)
C2 (inches) 12.00	62.00	930.00	7.60	7068.00	28.93	26908.00
C3 (inches)			J └ T	_]] []
C4 (inches)			→	_] [] [] []
C5 (inches)			J └ T	_]] []
C6 (inches)			→	_]] []
C7 (inches)			J	_] [] [] []
C8 (inches)			J └ T	_]] []
C9 (inches)			J └ T	_]] []
C10 (inches)		l			J [
Average Crush (inches):	15.00					
Results			Average		KE	Closing
itesuits	А	В	Force (poundsf)	Damage Energy (ft*lbs)	•	ta V Speed ph) (MPH)
Minimum [268.9	68.9	40374.40	64132.93		19.1 36.2
Avg - 2 Std. Deviations	220.7	33.3	22326.20	40496.64		15.1 28.5
Avg - 1 Std. Deviations	288.7	77.5	44987.20	70800.01	24.6	20.1 38.0
Average [356.7	121.7	67648.20	102026.37	29.5	24.2 45.8
Avg + 1 Std. Deviations	424.7	165.9	90309.20	133438.01	33.7	27.7 52.4
Avg + 2 Std. Deviations	492.7	210.1	112970.20	164917.98	37.5	30.8 58.3
Maximum [473.1	192.2	104039.10	152879.43	36.1	29.7 56.1
Damage Centroid Depth (x)	(inches)	7.60			k ² 3	186.82
Damage Centroid Depth (y)	(inches)	28.93	E	Eff. Mass Ratio (o	gamma)	1.00
Area of Damage (ir	nches²):	930.00				

2015 DODGE CHARGER - Side Impact

Curb Weight (pou Occupant + Cargo Weight (pou Total Weight (pou	nds): 0		rer Arm Distance		0.00 2862.50
Angle Coll Force to Normal (degr No Damage Speed (r Energy Crush Depth (inc Damage Length (inc	mph): 2.0 ches): 3.38				
C1 (inches) 0.00 C2 (inches) 7.00 C3 (inches) 4.00 C4 (inches) 0.00 C5 (inches)	Unequal Spacing Zone Are (inches) 31.00 108.9 19.00 64.0	²) (inches) 50 2.33 50 2.82	Area Depth(x) (inches³) 253.17 294.50 85.33	Zone Depth(y) (inches) 20.67 27.64 74.67	Area Depth(y) (inches³) 2242.33 2888.00 4778.67
Average Crush (inches): Results	3.38 A B	Average Force (poundsf) Er	•	KE Speed Delta (mph) (mph	
Minimum [190.6 235.0	40374.40	17331.49	11.5 17	.1 43.4
Avg - 2 Std. Deviations Avg - 1 Std. Deviations [136.6 120.7 202.3 264.8	22326.20 44987.20	19176.12		.9 46.1
Avg - 1 Std. Deviations [252.8 413.4	67648.20	28184.58		.6 57.6
Avg + 1 Std. Deviations	295.4 564.3	90309.20	37133.87		.7 67.2
Avg + 2 Std. Deviations	332.9 716.7	112970.20	46045.32	18.7 27	75.8
Maximum [318.6 656.5	104039.10	42536.84	18.0 26	.4 72.5
Damage Centroid Depth (x)					0.21
Damage Centroid Depth (y)		Eff.	. Mass Ratio (ga	mma)	1.00
Area of Damage (ii	nches²): 277.16				

2008 LINCOLN MKZ - Front Impact

2006 LINCOLN WIKZ - FIGHT IMPACT	
Curb Weight (pounds): 3519 Occupant + Cargo Weight (pounds): 0	PDOF Lever Arm Distance (inches): 0.00
Total Weight (pounds): 3519	Yaw Moment of Inertia (lb-ft-sec²) 2418.57
Angle Coll Force to Normal (degrees): 0.0	"Known" Stiffness Values A B
No Damage Speed (mph): 5.0	Average 356.7 121.7
Energy Crush Depth (inches): 15.00	Minimum 268.9 68.9
Damage Length (inches): 62.0	Maximum 473.1 192.2
Crush Profile Measurements: 2	Std. Devation 68.0 44.2
Equal	Zone Area Zone Area
Spacing Zone Area (inches) (inches²)	
C1 (inches) 18.00 (inches) 930.00	
C2 (inches) 12.00	
C3 (inches)	
C4 (inches)	
C5 (inches)	
C6 (inches)	
C7 (inches)	
C8 (inches)	
C9 (inches)	
C10 (inches)	
Average Crush (inches): 15.00	
Results	Average KE Closing
A B	Force Damage Speed Delta V Speed (poundsf) Energy (ft*lbs) (mph) (mph) (MPH)
Minimum 268.9 68.9	40374.40 64132.93 23.4 15.3 45.4
Avg - 2 Std. Deviations 220.7 33.3	22326.20 40496.64 18.6 12.0 35.8
Avg - 1 Std. Deviations 288.7 77.5	44987.20 70800.01 24.6 16.0 47.7
Average 356.7 121.7	67648.20 102026.37 29.5 19.3 57.4
Avg + 1 Std. Deviations 424.7 165.9	90309.20 133438.01 33.7 22.1 65.7
Avg + 2 Std. Deviations 492.7 210.1	112970.20 164917.98 37.5 24.6 73.1
Maximum 473.1 192.2	104039.10 152879.43 36.1 23.6 70.3
Damage Centroid Depth (x) (inches) 7.60	k ² 3186.82
Damage Centroid Depth (y) (inches) 28.93	Eff. Mass Ratio (gamma) 1.00
Area of Damage (inches²): 930.00	

2015 DODGE CHAI	KGEK - Side Impa				
Curb Weight (po		PDOF Lev	er Arm Distanc	e (inches):	64.00
Occupant + Cargo Weight (po Total Weight (po		Yaw Mor	ment of Inertia	(lb-ft-sec²)	2862.50
3 1					
ngle Coll Force to Normal (de					
No Damage Speed	(mph): 2.0				
Energy Crush Depth (in	nches): 3.38				
Damage Length (ii	nches): 82.0				
Crush Profile Measure					
	Unequal	Zone ea Depth(x)	Area Depth(x)	Zone	Area
	Spacing Zone Are (inches)		(inches ³)	Depth(y) (inches)	Depth(y) (inches³)
C1 (inches) 0.00	31.00 108.5	50 2.33	253.17	20.67	2242.33
C2 (inches) 7.00	19.00 104.5	50 2.82	294.50	27.64	2888.00
C3 (inches) 4.00	32.00 64.0		85.33	74.67	4778.67
C4 (inches) 0.00					
C5 (inches)]				
C6 (inches)]				
C7 (inches)]				
C8 (inches)]				
C9 (inches)]				
C10 (inches)]				
Average Crush (inches):	3.38				
Results		Average		KE	
Results	А В	Force (poundsf) Er	•	Speed Delta (mph) (mpł	
Minimum	190.6 235.0	40374.40	17331.49		3.6 43.4
Avg - 2 Std. Deviations	136.6 120.7	22326.20	10053.59		0.7 31.1
5		44987.20	19176.12		
Avg - 1 Std. Deviations					
Average	252.8 413.4	67648.20	28184.58		7.2 57.6
Avg + 1 Std. Deviations	295.4 564.3	90309.20	37133.87		67.2
Avg + 2 Std. Deviations	332.9 716.7	112970.20	46045.32		L.9 75.8
Maximum	318.6 656.5	104039.10	42536.84		L.1 72.5
Damage Centroid Depth (x	x) (inches) 2.29			k ² 336	60.21
Damage Centroid Depth (y	y) (inches) 35.77	Eff.	. Mass Ratio (ga	amma)	0.45
Area of Damage	(inches ²): 277.16				

Crash Test 3

Stiffness Test Summary
Force Balance no Lever Arm

Available Test Results Front Impact Test Summary

Report Filter Settings

Year Range: 1965 - 2021

Model: 626

Test Number	Vehicle Info	No Damage Speed (mph)	Average Crush (inch)	KEES (mph)	•	Vehicle iffness B			Crush Factor
599	1983 MAZDA 626 FOUR DOOR SEDAN	5.0	24.4	35.3	216.8	53.8	436.8	73.0	20.4
1055	1987 MAZDA 626 FOUR DOOR SEDAN	5.0	20.3	29.5	217.2	52.4	450.5	75.9	17.1
118	1980 MAZDA 626 TWO DOOR COUPE	5.0	22.5	35.2	253.0	67.7	472.7	92.0	21.9
1015	1987 MAZDA 626 FOUR DOOR SEDAN	5.0	24.0	35.0	262.6	65.6	525.9	89.3	20.4
1742	1993 MAZDA 626 FOUR DOOR SEDAN	5.0	20.0	35.0	276.5	82.9	461.2	112.8	24.5
2866	1998 MAZDA 626 FOUR DOOR SEDAN	5.0	11.4	29.6	496.7	213.5	577.8	309.2	30.6
		Averaç	ge (AVG)		287.1	89.3	487.5	125.4	22.5
	Minimum (MIN)				216.8	52.4	436.8	73.0	17.1
		Maximu	ım (MAX))	496.7	213.5	577.8	309.2	30.6
	Standard Deviation (STDev-sample)					61.8	53.8	91.2	4.6
Number of Tests (n)									

1996 MAZDA 626 - Front Impact

Curb Weight (pou		<u> </u>	PDOF .				
Occupant + Cargo Weight (pou		0	_ L	ever Arm Distar			0.00
Total Weight (pou	ınds): 262	26	Yaw M	oment of Inertia	a (lb-ft-sec²)		1498.78
Angle Coll Force to Normal (deg	rees): 0	.0	"Known" S	Stiffness Value			D
No Damage Speed (r	nph): 5	.0		Average	A 287.1		B 89.3
Energy Crush Depth (inc	ches): 18.4	10		Minimum	216.8		52.4
Damage Length (inc		Maximum 496.7 213.5 Std. Devation 105.5 61.8					
Crush Profile Measurem	St						
Crush Frome Weasurem	Unequal	3	Zone	Area	Zone		 Area
	Spacing	Zone Area	, , ,	Depth(x)	Depth(y	-	epth(y)
C1 (inches) 18.00	(inches)	(inches²)		(inches³)	(inches		inches³)
C2 (inches) 21.00	33.00	643.50					10890.00
C3 (inches) 13.00	26.00	442.00	8.66	3826.33	37.	98」 	16787.33
C4 (inches)			J	_	J		
C5 (inches)			_	_	」 		
C6 (inches)			_	_	J		
C7 (inches)			J	J	J		
C8 (inches)			_	J	J		
C9 (inches)			_	_]		
C10 (inches)] [
Average Crush (inches):	18.40						
Results			Average		KE		Closing
Results	А	В	Force (poundsf)	Damage Energy (ft*lbs)	Speed [(mph)	Delta V (mph)	Speed (MPH)
Minimum [216.8	52.4	34838.32	65981.71	27.5	23.3	38.7
Avg - 2 Std. Deviations	76.1	-34.3	N/A	N/A	N/A	N/A	N/A
Avg - 1 Std. Deviations	181.6	27.5	20284.20	42554.21	22.0	18.6	31.0
Average [287.1	89.3	56941.49	103505.36	34.4	29.2	48.5
Avg + 1 Std. Deviations	392.6	151.1	93598.78	165374.08	43.5	36.9	61.4
Avg + 2 Std. Deviations	498.1	212.9	130256.07	227361.32	51.0	43.2	72.0
Maximum [496.7	213.5	130540.45	227716.27	51.0	43.3	72.0
Damage Centroid Depth (x)	(inches)	9.32			k² [2646.44	4
Damage Centroid Depth (y)	(inches)	25.50	E	Eff. Mass Ratio (gamma) [1.00	0
Area of Damage (ii	nches²):	L085.60					

2016 DODGE CHAP	RGER					
Curb Weight (po	PDOF Le	PDOF Lever Arm Distance (inches): Yaw Moment of Inertia (lb-ft-sec²)				
ccupant + Cargo Weight (pounds): Total Weight (pounds): 3950						
Total Weight (po	unds): [39:	<u>50 </u>				2862.50
gle Coll Force to Normal (deg	grees):0	0.0				
No Damage Speed ((mph): 2	2.0				
Energy Crush Depth (ir	iches): 2. 7	72				
Damage Length (ir	nches): 92	2.0				
Crush Profile Measurer	nents:	4				
	Unequal	7 4	Zone	Area	Zone	Area
	Spacing (inches)	Zone Area (inches²)	Depth(x) (inches)	Depth(x) (inches³)	Depth(y) (inches)	Depth(y) (inches³)
C1 (inches) 0.00	44.00	44.00		29.33	29.33	1290.67
C2 (inches) 2.00		12.50		15.83	7.67	95.83
C3 (inches) 3.00	43.00	193.50			109.89	21263.50
C4 (inches) 6.00] []		
C5 (inches)]		1			
C6 (inches)]					
C7 (inches)]] [] [
C8 (inches)]		_	, ,		
C9 (inches)]		」] [, ,		
C10 (inches)]					
Average Crush (inches):	2.72					
Results			Average		KE	.,
	А	В	Force (poundsf) E	Damage Energy (ft*lbs)	Speed Delta (mph) (mpl	
Minimum	172.2	215.1	34838.32	13031.75		5.5 44.0
Avg - 2 Std. Deviations	N/A	N/A	N/A	N/A		/A N/A
Avg - 1 Std. Deviations	126.3	115.7	20284.20	7954.56		2.4 32.3
Average	226.4	371.9	56941.49	20655.05	12.5	9.4 57.8
Avg + 1 Std. Deviations	296.8	639.0	93598.78	33188.31	15.9	4.5 75.8
Avg + 2 Std. Deviations	354.3	910.8	130256.07	45649.46	18.6	8.7 90.5
Maximum	354.7	912.9	130540.45	45745.94	18.6	8.8 90.6
Damage Centroid Depth (x) (inches)	1.99			k ² 336	60.21
Damage Centroid Depth (y	(inches)	90.60	Ef	f. Mass Ratio (g	amma)	1.00
Area of Damage	inches²). [250 24				